REMARKS

Claims 17-36 are pending. Claims 23-27 have been withdrawn from consideration. Claims 17-22 and 28-36 are rejected. Claims 22, 30 and 33 are cancelled. Claims 17, 28, 31 and 34 are amended. Support for the amendments can be found throughout the application, for instance in the specification and claims as originally filed. No new matter is added. Claims 17-22 and 28-36 are submitted for further consideration at this time. Applicants respectfully request reconsideration and withdrawal of all rejections.

Claim Rejections - 35 U.S.C. 102

Claims 17-22 and 28-36 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 03-020112 to Sankyo.

Claims 17-22 and 28-36 are also rejected under 35 U.S.C. 102(b) as being anticipated by JP 09-025935 to Mori et al. (NTN Corp).

It is alleged that both Sankyo and Mori et al. disclose each and every element of the claimed invention.

Applicants respectfully disagree. The present invention in a preferred embodiment is concerned with a method of producing a hydrodynamic type porous oil-impregnated bearing comprising a porous bearing body being formed with bearing surface on an inner peripheral surface thereof, said bearing surface having inclined hydrodynamic pressure generating grooves, and oil retained in pores of said bearing body by impregnation of lubricating oil or lubricating grease, said method comprising the steps of: inserting a forming pattern in an inner peripheral surface of a cylindrical

porous blank, said forming pattern having a first forming portion for forming a region of said hydrodynamic pressure generating grooves and a second forming portion for forming the other region in said bearing surface, applying a compacting pressure to said porous blank to press the inner peripheral surface of said porous blank against said forming pattern, thereby simultaneously forming the region of said hydrodynamic pressure generating grooves and the other region in said bearing surface on the inner peripheral surface of said porous blank, and after forming said bearing surface, releasing said forming pattern from the inner peripheral surface of said porous blank while utilizing the spring-back of said porous blank due to removal of said compacting pressure. *See* claim 17.

In a preferred embodiment, the present invention is also concerned with a method of producing a hydrodynamic porous oil-impregnated bearing comprising a porous bearing body being formed with a bearing surface on an inner peripheral surface thereof, said bearing surface having a plurality of inclined hydrodynamic pressure generating grooves, and oil retained in pores of said bearing body by impregnation of lubricating oil or lubricating grease, said method comprising the steps of: inserting a forming pattern in an inner peripheral surface of a cylindrical porous blank, said porous blank being made of a sintered metal, said forming pattern having a forming portion for forming said hydrodynamic pressure generating grooves, said forming portion being composed of a plurality of convex portions each of which agrees with each of said hydrodynamic pressure generating grooves, applying a compacting pressure to said porous blank to press the inner peripheral surface of said porous blank against said forming portion of said forming pattern, thereby forming said hydrodynamic pressure

generating grooves in the inner peripheral surface of said porous blank, and after forming said hydrodynamic pressure generating grooves, removing said compacting pressure, releasing said forming pattern from the inner peripheral surface of said porous blank whilst utilizing spring-back of said porous blank due to the removal of said compacting pressure. *See* claim 28.

Also in an additional preferred embodiment, the present invention is concerned with a method of producing a porous bearing body of a hydrodynamic type porous oil-impregnated bearing, said porous bearing body being formed with bearing surface on an inner peripheral surface thereof, said bearing surface having a plurality of inclined hydrodynamic pressure generating grooves, said method comprising the steps of: inserting a forming pattern in an inner peripheral surface of a cylindrical porous blank, said porous blank being made of a sintered metal, said forming pattern having a forming portion for forming said hydrodynamic pressure generating grooves, said forming portion being composed of a plurality of convex portions each of which agrees with each of said hydrodynamic press generating grooves, applying a compacting pressure to said porous blank to press the inner peripheral surface of said porous blank against said forming portion of said forming pattern, thereby forming said hydrodynamic pressure generating grooves in the inner peripheral surface of said porous blank, and after forming said hydrodynamic pressure generating grooves, removing said compacting pressure, releasing said forming pattern from the inner peripheral surface of said porous blank whilst utilizing spring-back of said porous blank due to the removal of said compacting pressure. *See* claim 31.

In another preferred embodiment, the present invention is concerned with a method of producing a hydrodynamic porous oil-impregnated bearing, a porous bearing body of which is formed with bearing surface on an inner peripheral surface thereof, said bearing surface having inclined hydrodynamic pressure generating grooves, said method comprising the steps of: inserting a forming pattern in an inner peripheral surface of a porous blank, said forming pattern having a forming portion for forming said hydrodynamic pressure generating grooves, said forming portion comprising a plurality of convex portions, each of which agrees with each of said hydrodynamic pressure generating grooves, pressing said forming portion of said forming pattern against said inner peripheral surface of said porous blank, thereby making plastic deformation of said inner peripheral surface of said porous blank occur to form said hydrodynamic pressure generating grooves, and after forming said hydrodynamic pressure generating grooves, removing said pressing, releasing said forming pattern from the inner peripheral surface of said porous blank whilst utilizing spring-back of said porous blank due to the removal of said pressing. *See* claim 34.

Applicants wish to point out that when press forming inclined hydrodynamic pressure generating grooves in an inner peripheral surface of a cylindrical blank, it becomes important to consider how a forming pattern is released from the inner peripheral surface of the cylindrical blank without breaking the inclined grooves. If the forming pattern and the cylindrical blank are made to relatively move in the axial direction to be released under existing compacting (or pressing) pressure, the inclined grooves will be broken.

However, as discussed above, in preferred embodiments, the present invention is able to address this problem by utilizing the "spring-back" of the cylindrical porous blank. Generally, the amount of "spring-back" of a porous material is greater than that of a solid material. As discussed at page 24, line 7 to page 25, line 4 of the specification, the amount of spring-back Q is in relation to the inner clearance T and the outer interference U. *See* Figures 12 and 16. By making the radial amount of spring-back Q greater than the depth H of the inclined groove, the forming pattern can be released from the inner peripheral surface of the cylindrical porous blank without breaking the inclined grooves. Of course, there is the possibility that even when the radial amount of spring-back Q is less than the depth H of the inclined groove, the forming pattern may be released without breaking the inclined grooves.

Applicants respectfully submit that no such invention is taught or suggested in the prior art including the cited references. In contrast to the claimed invention, Sankyo discloses a bearing material 1, 2, 9 and 10 that is parted (split) at one or more locations along peripheral locations for easy removal from a sizing stick 3. Therefore, Sankyo contains absolutely no teaching or suggestion with respect to the "spring-back" of a porous blank, for the advantageous release of a forming pattern, as is required in the claimed invention.

Also in contrast to the claimed invention, Mori et al. discloses a bearing 4 with axially extending grooves 4b. Applicants point out that even if the axially extending grooves 4b could be press formed by a forming pattern in the inner peripheral surface, the axially extending grooves 4b would not be broken by relative movement of the forming pattern and the bearing in the axial direction under existing compacting (or

pressing) pressure. In other words, Mori et al. does not require any "spring-back" for releasing the forming pattern, as in the claimed invention, and thus contains no teaching or suggestion in this regard.

Therefore, Sankyo and Mori et al., alone or in combination, fail to teach or suggest each and every element of the claimed invention, and Applicants urge withdrawal of the rejections.

Claim Rejections - 35 U.S.C. 103

Claims 17-22 and 28-36 are rejected under 35 USC §103(a) as being obvious over Applicant's Admitted Prior Art ("AAPA") alleged to be found at pages 1-4 of the specification, in view of U.S. Patent No. 3,799,629 to Laing.

It is alleged that it would have been obvious to have formed the hydrodynamic bearing grooves of the bearing of the alleged AAPA, by inserting a forming pattern into the inner peripheral surface of a porous blank, in view of the teachings of Laing.

Applicants respectfully disagree. As discussed above, the claimed invention requires releasing a forming pattern from the inner peripheral surface of a porous blank whilst utilizing spring-back of the porous blank due to the removal of compacting or pressing pressure. However, neither of the cited references contain any teaching or suggestion in this regard. Applicants point out that the alleged AAPA contains no teaching or suggestion with respect to the "spring-back" of a cylindrical porous blank, as claimed, for the advantageous release of a forming pattern. Moreover, Laing clearly states that "[g]rooves 21 follow spiro-helical lines. In manufacture this is done by using a male mould which is allowed to rotate during ejection of the material of the body 20."

See col. 2, line 43-46. Thus, Laing does not require, and also fails to teach or suggest, any "spring-back" of the body 20, in accordance with the claimed invention. Thus, neither of the cited references, alone or in combination, teach or suggest each and every element of the claimed invention, and Applicants urge withdrawal of the rejection.

In view of the amendments and remarks above, Applicants submit that this application is in condition for allowance and request favorable action thereon.

In the event this paper is not timely filed, applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to our Deposit Account No. 01-2300, along with any other additional fees which may be required with respect to this paper referencing Attorney Docket No. 10725-00047 .

Respectfully submitted,
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Enclosure: Marked Up Copy of the Claims

Marked up copy of the claims

17. (Amended) A method of producing a hydrodynamic type porous oil-impregnated bearing comprising a porous bearing body being formed with bearing surface on an inner peripheral surface thereof, said bearing surface having inclined hydrodynamic pressure generating grooves, and oil retained in pores of said bearing body by impregnation of lubricating oil or lubricating grease, said method comprising the steps of:

inserting a forming pattern in an inner peripheral surface of a cylindrical porous blank, said forming pattern having a first forming portion for forming a region of said hydrodynamic pressure generating grooves and a second forming portion for forming the other region in said bearing surface, applying a compacting pressure to said porous blank to press the inner peripheral surface of said porous blank against said forming pattern, thereby simultaneously forming the region of said hydrodynamic pressure generating grooves and the other region in said bearing surface on the inner peripheral surface of said porous blank[;], and

after forming said bearing surface, releasing said forming pattern from the inner peripheral surface of said porous blank while utilizing the spring-back of said porous blank due to removal of said compacting pressure.

28. (Amended) A method of producing a hydrodynamic porous oil-impregnated bearing comprising a porous bearing body being formed with a bearing surface on an inner peripheral surface thereof, said bearing surface having a plurality of inclined hydrodynamic pressure generating grooves, and oil retained in pores of said bearing body by impregnation of lubricating oil or lubricating grease, said method comprising the steps of:

inserting a forming pattern in an inner peripheral surface of a cylindrical porous blank, said porous blank being made of a sintered metal, said forming pattern having a forming portion for forming said hydrodynamic pressure generating grooves, said forming portion being composed of a plurality of convex portions each of which agrees with each of said hydrodynamic pressure generating grooves, [and]

applying a compacting pressure to said porous blank to press the inner peripheral surface of said porous blank against said forming portion of said forming pattern, thereby forming said hydrodynamic pressure generating grooves in the inner peripheral surface of said porous blank, and

after forming said hydrodynamic pressure generating grooves, removing said compacting pressure, releasing said forming pattern from the inner peripheral surface of said porous blank whilst utilizing spring-back of said porous blank due to the removal of said compacting pressure.

31. (Amended) A method of producing a porous bearing body of a hydrodynamic type porous oil-impregnated bearing, said porous bearing body being formed with bearing surface on an inner peripheral surface thereof, said bearing surface having a plurality of inclined hydrodynamic pressure generating grooves, said method comprising the steps of:

inserting a forming pattern in an inner peripheral surface of a cylindrical porous blank, said porous blank being made of a sintered metal, said forming pattern having a forming portion for forming said hydrodynamic pressure generating grooves, said forming portion being composed of a plurality of convex portions each of which agrees with each of said hydrodynamic press generating grooves, [and]

applying a compacting pressure to said porous blank to press the inner peripheral surface of said porous blank against said forming portion of said forming pattern, thereby forming said hydrodynamic pressure generating grooves in the inner peripheral surface of said porous blank, and

after forming said hydrodynamic pressure generating grooves, removing said compacting pressure, releasing said forming pattern from the inner peripheral surface of said porous blank whilst utilizing spring-back of said porous blank due to the removal of said compacting pressure.

34. (Amended) A method of producing a hydrodynamic porous oil-impregnated bearing, a porous bearing body of which is formed with bearing surface on an inner peripheral surface thereof, said bearing surface having inclined hydrodynamic pressure generating grooves, said method comprising the steps of:

inserting a forming pattern in an inner peripheral surface of a porous blank, said forming pattern having a forming portion for forming said hydrodynamic pressure generating grooves, said forming portion comprising a plurality of convex portions, each of which agrees with each of said hydrodynamic pressure generating grooves, [and]

pressing said forming portion of said forming pattern against said inner peripheral surface of said porous blank, thereby making plastic deformation of said inner peripheral surface of said porous blank occur to form said hydrodynamic pressure generating grooves, and

after forming said hydrodynamic pressure generating grooves, removing said pressing, releasing said forming pattern from the inner peripheral surface of said porous blank whilst utilizing spring-back of said porous blank due to the removal of said pressing.